

# ACCELERATED SITE TECHNOLOGY DEPLOYMENT

## Technology Fact Sheet Smart 3D Contaminant Characterization of the Brookhaven Graphite Research Reactor

Brookhaven National Laboratory  
In Partnership with the Office of Science and Technology

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**INTRODUCTION:** The Brookhaven Graphite Research Reactor (BGRR) is currently on an accelerated decommissioning schedule with a completion date projected for 2005. A major project concern involves determining the extent of contamination on the exterior of underground ducts and canals, and in the soils beneath these structures. To address these issues, EM's Office of Science and Technology (OST) has partnered with Brookhaven National Laboratory (BNL) in an Accelerated Site Technology Deployment project. This ASTD project will deploy a suite of innovative technologies to complete characterization and provide a visualization of the levels of soil contamination below the underground structures at the BGRR within one year.

**TECHNICAL NEED:** The BGRR ceased operation in 1968 and was placed in a shutdown mode in which all fuel was removed and sent to the Savannah River Site, and all penetrations in the biological shield around the graphite cube and fuel channels were sealed. During operation and following shutdown of the Pile, the underground air ducts (plenum) had water intrusion attributed to rainwater and internal cooling water leaks into degraded parts of the system. The BGRR D&D Project Baseline estimates the cost of removing the underground air plenum, which is necessary to provide access for remediation of any contaminated soils below the plenum, at \$3.4 million. The focus of this ASTD is to characterize soils beneath the main air plenum connecting the exhaust plenums with the Fan House, and also beneath the Canal House, at the junction where the canal extends into the main BGRR facility (Building 701). The canal has a seam at the outside wall of Building 701 and historical information documents that the seam leaked and was repaired once during the operation of the BGRR. The baseline cost of removing the canal is estimated at \$0.8 million.

If it can be shown that the soils under these structures are not contaminated above the established regulatory criteria, then removal of the air plenum and canal will not be necessary.



**Brookhaven Graphite Research Reactor Building 701**

**SYSTEM DESCRIPTION:** This project will deploy a suite of technologies to address BNL Need CH-DD01-99 "Characterization for D&D of the Brookhaven Graphite Research Reactor." Specific technologies proposed for deployment within this ASTD project include:

- Small footprint Geoprobe
- POLO Positioning System (used with the Geoprobe)
- 3D Modeling (EVS-PRO visualization and sampling optimization tool)
- In Situ Object Counting System
- BetaScint
- Frisch Chamber Alpha Spectroscopy
- 3M Empore Disk for Sr-90
- PipeExplorer

Caissons will provide the access to the subsurface soils below the air ducts and spent fuel canal without requiring removal of these structures. Characterization using caisson access combined with multiple innovative technologies



has applicability at any site with large structures and potential underground contamination.

**BENEFITS:** Application of the innovative technologies will enable a determination to be made on the level of contamination beneath the subsurface structures. The increased quality and quantity of characterization data combined with graphic 3-dimensional visualizations of the extent of contamination will result in more rapid decision-making and consensus building with external stakeholders about the need for complete subsurface removal. It is estimated that this ASTD project will result in direct savings of \$3.4 million and indirect savings of \$850,000

through accelerated schedules and reduced administrative costs. Other benefits resulting from this project include reduced worker exposure and potentially reduced waste volumes for off-site disposal as low level waste.

**STATUS: Status currently under development**

Secondary deployments are planned at Hanford, Nevada Test Site, Rocky Flats, and the BNL High Flux Beam reactor.

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**For more information about the deployment of the 3D Smart Contaminant Characterization, contact:**  
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